

Measuring service quality in higher education: the Experience of Technological Education Institute of Central Macedonia, Greece

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Abstract

In today's turbulent environment, higher education institutes are facing widespread economic, technological, and cultural changes and increased competition in social and political contexts. Provision of quality services in higher education must be viewed as a strategic issue for development and economic growth. Since students are the driving force in demanding changes and the primary customer in higher education, institutes should place efforts to understand and meet or exceed their expectations in order to succeed in the competitive higher education environment. The paper aims at investigating quality of services in Technological Education Institute of Central Macedonia, Greece. An online survey was conducted. A modified version of HEDPERF, adapted to the institute's needs and characteristics was used in order to assess service quality. Summary statistics of the dimensions of the modified HEDPERF and their correlation coefficients were used in the statistical analysis. An effort was made to investigate how HEDPERF dimensions influence major educational issues. Multiple linear regression and logistic regression techniques were employed in order to detect which dimensions are statistically significant for every educational issue. Both methodologies resulted in two clusters of dimensions that affect service quality whereas the regression coefficients quantify the contribution of each dimension to the specific educational issues. Knowing the relative performance of different dimensions and issues could help institute's managers to gain deeper insights into higher education service quality, draft various managerial strategies on how to improve activities of the organization and the provided services, and make better resource allocation.

Keywords: service quality, higher education, HEDPERF, Greece

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Introduction

Nowadays education worldwide has become one of the primary determinants of employment status, standard of living, and economic development (Prasad & Jha, 2013). Higher education institutions are competing in an open market to offer quality services. Assurance of service quality becomes an essential strategy for guaranteeing their survival (Ramaiyah et al. 2007; Zafiropoulos & Vrana 2008) and a key factor for socio-economic development (Feigenbaum 1994).

In Greece, the basic requirement for admission to Higher Education (Universities and Universities of Applied Sciences) is the possession of the General Upper Secondary Schools or Vocational Upper Secondary Schools leaving certificate. Graduates participate in the Pan-hellenic Examinations a system which is centrally coordinated by the Ministry of Education, Research and Religious Affairs. The number of students allocated to each higher education institute department annually is laid down by the Ministry of Education, Research and Religious Affairs. Selection is based on the students' performance during in the Pan-hellenic Examinations and the processing of students' preferences. A few places available for candidates who belong to special categories/special circumstances/athletes, etc. and who fulfill certain conditions. Thus, Greek Universities and Universities of Applied Sciences compete to a certain degree. Last years major efforts are currently under implementation of a new quality assurance system for higher education. The independent authority 'Hellenic Quality Assurance and Accreditation Agency' (ADIP) began in 2005 to accredit the quality of Institutes of Higher Education. In order to facilitate the processes of self-evaluation to universities, ADIP has founded independent units in each institute, called Quality Assurance Units (MODIP). These units are responsible of coordinating and supporting the quality assurance procedures. For the moment research for service quality in higher education in Greece is very limited (Trivellas & Dargenidou, 2009; Trivellas et al., 2012; Terzakis et al., 2012; Zafiropoulos 2005, 2006; Zafiropoulos et al. 2008; Zafiropoulos & Vrana 2008) and is restricted to particular Higher Education Institutes. The Quality Assurance Unit of T.E.I. of Central Macedonia has put a strong focus on researching and practicing performance measurement in many modules of the Institute.

The paper aims at measuring the determinants of service quality in TEICM. It uses a modified HEDPERF instrument that fits in the Greek higher education section (Vrana et al., 2015). Additionally, three important educational issues are used to investigate their association to the modified HEDPERF dimensions. Questionnaires were administered both to the undergraduate and postgraduates students of all the departments, as students are now being viewed as the primary customers of higher education services and want to be assured that the university provides quality services (Hill, 1995; Karapertovic & Rajamani, 1997).

Quality in higher education

Quality in education is defined as the 'conformance of education output to planned goals, specifications and requirements' (Crosby 1979, p.68) or according to Parasuraman et al. (1985) as 'meeting or exceeding customer's expectations of education'. The evidence of service quality is provided when the customer interacts with the organization during the 'moment of truth' (Fitzsimmons & Fitzsimmons, 2004) and has evolved in terms of satisfying the needs and wants of customers

(Seyanont, 2007). In this vein Parányi (2005, p. 19) claimed that 'quality is good if it is deemed to be good by the customer'.

The earlier attempts for measuring service quality in higher education emphasized on academic aspects and the quality of teaching and courses (Athiyaman 1997; Bournier 1998; Soutar & McNeil 1996; Yorke 1992). As administrative services compliment academic, Kamal & Ramzi (2002) made the first attempt to measure students' perceptions of registration and academic advising. Later on, Quality Function Deployment was used aiming at answering the question how to deliver quality services based on the needs or voices of higher education customers. The applications were focused on design of engineering education and curricula (Aytac & Deniz 2005; Bier & Cornesky 2001; Burgar 1994; Owlia & Aspinwall 1998) and other academic and administrative aspects (Ermer 1995).

SERVQUAL instrument has attracted the greatest attention to measure the perceived quality in higher education sector (D'Uggento et al. 2006; Gibbs 2004; Oldfield & Baron 2000; O'Neill, 2003; Pariseau & McDaniel, 1997; Shekarchizadeh 2011; Zafiroopoulos & Vrana 2008). The instrument compares the perceptions of the service received with expectations, and there is a set of five gaps (Assurance, Responsiveness, Empathy, Reliability and Tangibles) regarding the executive perceptions of service quality and the tasks associated with service delivery (Parasuraman et al., 1985). SERVQUAL attracted also a lot of criticism. Once an individual has experienced a service, his/her expectations change and are becoming lower if the encounter is dissatisfying or higher if it is satisfying. Thus, Philip & Hazlett (1997) claimed that it would not make sense to measure something that is constantly changing. As a result, performance-only-based measures of service quality models arose.

An alternative instrument which measures performance only, the SERVPERF was developed and tested by Cronin & Taylor (1992). They claimed that 'service quality should be measured as an attitude' (Cronin & Taylor 1992, p. 64) and claimed that SERVPERF has greater predictive power and performs better than any other measure of service quality. The instrument includes five dimensions: reliability, assurance, tangibles, empathy, and responsiveness as SERVQUAL. SERVPERF was also used in higher education sector to measure service quality (Bayraktaroglu 2010; Firdaus 2006a; Lee 2007). However both SERVQUAL and SERVPERF are generic models for measuring service quality. A measuring instrument of service quality that captures the authentic determinants of service quality within the higher education sector would be more adequate (Sultan & Tarafder, 2007).

Use of the HEdPERF in higher education institutes

Firdaus (2006b) proposed a performance-based measuring scale the HEdPERF model (Higher Education PERFORMANCE-only) that attempts to capture the authentic determinants of service quality within higher education sector. During the development of HEdPERF, Firdaus (2006b) conducted a survey at six tertiary institutions throughout Malaysia and collected 409 completed questionnaires. The proposed 41-item instrument was empirically tested for unidimensionality, reliability and validity using both exploratory and confirmatory factor analysis. The six dimensions are:

- *Non-academic aspects*: Consists of items that are essential to enable students fulfill their study obligations, and it relates to duties carried out by non-academic staff.
- *Academic aspects*: The items are solely the responsibilities of academics.
- *Reputation*. Items that suggest the importance of higher learning institutions in projecting a professional image.
- *Access*: Items that relate to such issues as approachability, ease of contact, availability and convenience.
- *Programmes issues*: Items emphasize at the importance of offering wide ranging and reputable academic programmes/specializations with flexible structure and syllabus.
- *Understanding*: Items related to understanding students' specific need in terms of counseling and health services.

Firdaus (2006b) found that many service quality attributes may influence students' perception to a certain extent. However *Access* dimension has significantly influenced the overall service quality perception and is perceived to be more important than other dimensions in determining the quality of the services. Later on Firdaus (2006a) the *Understanding* dimension was permanently removed.

Firdaus (2006a) compared the relative efficacy of three measuring instruments HEdPERF, SERVPERF and the moderating scale of HEdPERF-SERVPERF in order to determine which instrument had the superior measuring capability. 381 questionnaires were collected from students in two public universities, one private university and three private colleges in Malaysia. Findings demonstrated that a modified five-factor structure of HEdPERF, used in the study, with 38 items may be the superior instrument in measuring service quality within higher education.

Brochado (2009) aiming at examining the performance of five alternative instruments of service quality SERVQUAL, importance-weighted SERVQUAL, SERVPERF, importance-weighted SERVPERF, and HEdPERF, gathered data from a sample of 360 students of a Portuguese University in Lisbon. Scales were compared in terms of unidimensionality, reliability, validity and explained variance. According to the findings SERVPERF and HEdPERF present the best measurement capability, but from the study it was not possible to identify which one is the best.

Sultan & Wong (2012) aiming at investigating how one's culture affects service quality assessment in a higher education context, operationalised service quality construct including seven items from HEdPERF seven items from PHED measure, four items from Fornell et al. (1996), one item from Cronin & Taylor (1992) and seven items from discussion with focus groups. Their findings indicate that students do not perceive any differences in academic service quality irrespective of their cultural backgrounds. However, more research is required to fully understand the dynamic nature of culture and its influence on higher education sector.

Wibisono & Nainggolan (2009) claimed that although HEdPERF instrument has good validity, the test of instrument was held only in Malaysia. Thus in their research, they tested the validity of HEdPERF before it was used to measure the quality of higher education in Industrial Engineering Department of Catholic Parahyangan University (IE-Unpar). The result of this research showed that the instrument consists of 7 factors namely nonacademic, academic, reputation, empathy, student-activity, facility, and location. All factors had a good reliability. The instrument had a criterion validity score of 0.69.

Legcevic (2010) aiming at evaluating the relative efficacy of HEdPERF and SERVPERF and at an in-depth exploration of service quality in higher education conducted a survey at the University of Osijek in Croatia. A total of 1,494 questionnaires were collected from students and were subjected to factor analysis. Results indicate that student's perceptions of service quality are changing over the period of study, class attendance and faculty achievement. She carried out a principal component analysis and yielded another factor. Thus the factors suggested are Empathy, Tangibility, Reliability, Competence and confidence, Non-academic aspect and Academic aspect.

In order to ascertain business students' perception of quality of service provided by public and private universities in Kenya, Kimani et al. (2011) conducted a study using the HEdPERF instrument. Findings indicated that most university students were positive about the quality of service they received in their universities. Factors that determined service quality in Kenya universities were administrative quality, academic quality, programs quality, student support, and availability of resources.

HEdPERF was also used by Ravichandran et al. (2012) in order to empirically measure the service quality level among engineering colleges/Institutions which are offering professional courses in Tiruchirappalli, Tamilnadu, India. Findings from the study indicate that standardized syllabus and structure, quality programs, students feedback for progressive measures, empathetic administrative staff to solve students problem and fair and equal treatment are the dominant variables strongly predicts the overall service quality. What is more important is that using factor analysis, it is inferred that a HEdPERF scale is not factor loaded as per the proposed original dimensions, instead they got a loading of eleven factors/dimensions.

Methodology

An empirical research study was conducted from 2/4/2012-25/5/2012, using the online survey module of the Quality Assurance Information System (QAIS). Students were asked to rank their perception in relation to service quality with a seven-point Likert scale. The QAIS is an application suite which was implemented by the Quality Assurance Unit (QAU) of TEICM, in order to put into effect evaluation and quality management procedures in the Institute. In order to raise awareness, the survey was actively advertised via the home page of the Institute's website and students who participated in the survey went into a draw to win a laptop. A total of 469 questionnaires were collected.

The HEdPERF instrument, as provided Vrana et al. (2015) was used. The dimensions used are: *Academic aspects, Facilities, Program issues, Staff, Support services*. Next, an effort was made to investigate how HEdPERF dimensions are linked to students' attitudes about important educational issues. In this vein three educational issues were investigated, namely Edu1: to scientific adequacy and teaching capability, Edu2:

Feedback provided by the professors, Edu3: Special services. Special services items are:

1. web page of TEICM (www.teicm.gr)
2. email services
3. e-Learning platform
4. Electronic secretariat
5. Quality Assurance Unit
6. Employment and Career Center, Liaison Office & Innovation and Entrepreneurship Unit
7. Network operating center
8. Library
9. Lifelong Learning Program / Erasmus

In order to find the statistically significant dimensions of HEDPERF that are associated with the educational issues under investigation multiple regression and logistic regression techniques were employed. All the computations and graphical displays were implemented with R the well-known statistical language (R Core Team, 2016). Specifically, the commands *lm* for multiple regression and *glm* for logistic regression of the *stat* package were used. Additionally, the *scatterplot3d* package was used for 3D scatter diagrams (Ligges and Machler, 2003).

Findings

Sample description

The sample consists of 469 students of the TEICM, 262 males (55.86%) and 207 females (44.14%). Most of the correspondents (246 undergraduate students, 52.45% of the sample) attend to the Faculty of Administration & Economic, which consists of the Business Administration and Accounting & Finance departments. The other major portion of the sample (203 undergraduate students, 43.28%) is derived from the Faculty of Applied Technology, which consists of the departments of Geomatics & Surveying, Civil Engineering, Mechanical Engineering and Informatics & Communications. Only two students (0.43% of the sample) who attend the undergraduate course of the Faculty of Fine Arts and eighteen postgraduate students (3.84% of the sample) studying at TEICM complete the sample.

Table 1. Students sample description

		Frequency	Percentage
Gender	Male	262	55.86
	Female	207	44.14
Undergraduate students	Faculty of Applied Technology	203	43.28
	Faculty of Fine Arts	2	0.43
	Faculty of Administration & Economics	246	52.45

Postgraduate students	18	3.84
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The five dimensions of the modified HEdPERF are *Academic aspects*, *Facilities*, *Program issues*, *Staff* and *Support services* and three important educational issues were considered in order to find connections that influence the educational process. Specifically, *Edu 1* corresponds to scientific adequacy and teaching capability of the professors, *Edu 2* to the feedback provided by the professors and *Edu3* to special services of TEICM.

Next, the summary statistics of HEdPERF dimensions and the questionnaire with the educational issues are presented.

Table 2. Summary statistics

Dimensions/Questions	Mean	Standard deviation
Academic aspects	4.87	1.15
Facilities	5.10	1.09
Program issues	4.72	1.21
Staff	4.26	1.55
Support services	4.57	1.24
Edu1: to scientific adequacy and teaching capability (range:1 to 7)	5.07	1.15
Edu2: Feedback (range:1 to 7)	4.44	1.44
Edu3: Special services (range:1 to 5)	4.15	0.72

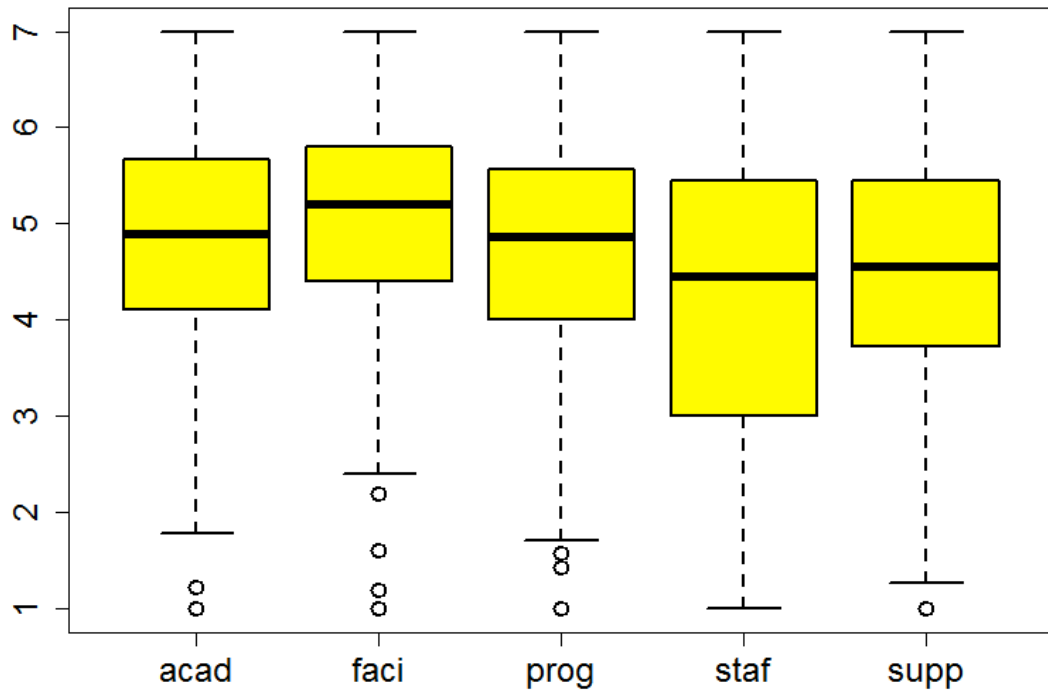


Figure1: Boxplots of HEdPERF dimensions

Boxplots for every dimension reveals a generally positive opinion of the respondents about the service quality provided by TEICM. The *staf* dimension has the lowest mean, the highest standard deviation and the most negative opinions. The other dimensions of HEdPERF have similar statistical characteristics (median and interquartile range).

Statistical models

The following histogram presents the opinions of the respondents about *Edu1*. The distribution is negative skewed showing the positive opinion of students.

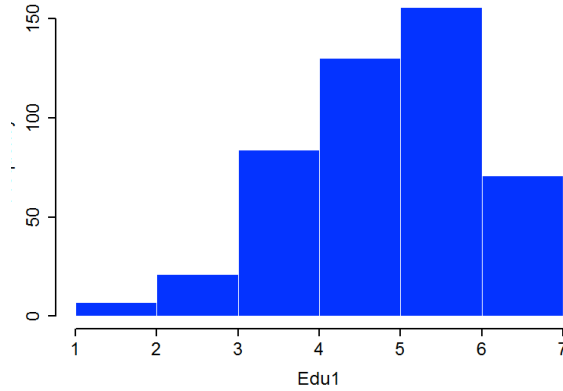


Figure 2: Histogram of Edu1

Multiple linear regression was employed to investigate the statistically significant dimensions of HEdPERF that are associated with *Edu1*. The generated regression model detected only two dimensions that influence *Edu1* with significance level less than 0.001. Specifically, the following table was obtained:

Table 3: Multiple linear regression results for *Edu1*

	estimates	std. error	t value	p value
(Intercept)	0.64782	0.11253	5.757	1.56e-08 ***
acad	0.80348	0.02844	28.250	< 2e-16 ***
prog	0.10718	0.02700	3.969	8.34e-05 ***

The multiple R-squared is 0.7862 indicating a sufficiently fit of the model to the data set that is confirmed by the 3D scatterplot in Figure 3. The generated equation is

$$\mathbf{Edu1} = 0.65 + 0.80 \cdot \mathbf{acad} + 0.11 \cdot \mathbf{prog}$$

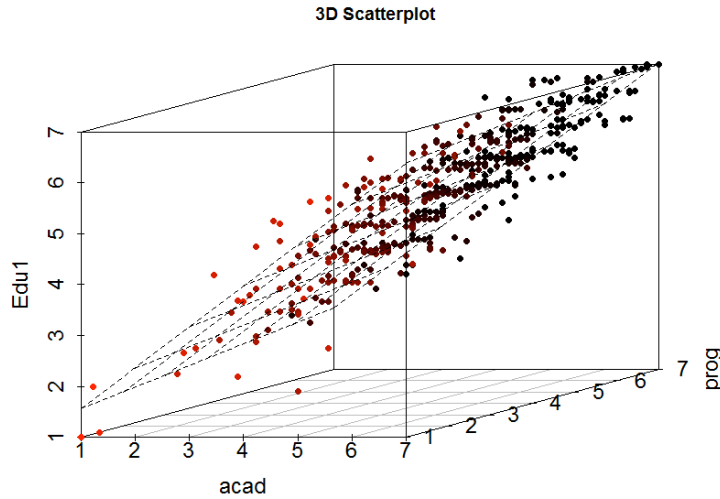


Figure 3: 3D scatter plot for Edu1

The following histogram represents the opinions regarding *Edu2* that is very close to a Normal distribution.

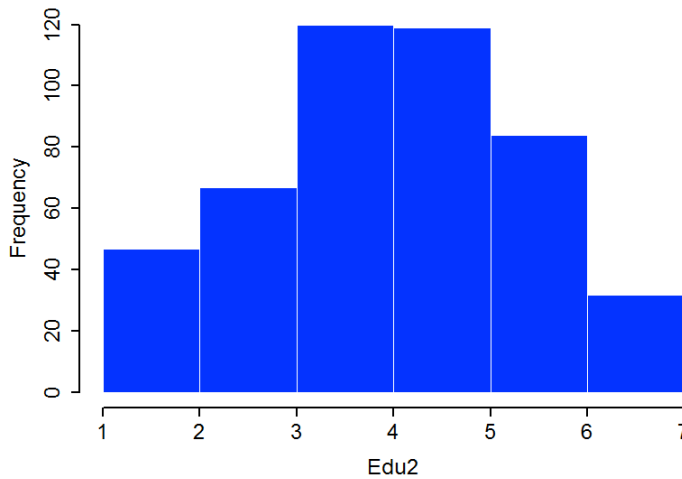


Figure 4: Histogram of Edu2

Then logistic regression technique was used to estimate the probability p of the event “a student is satisfied from feedback”. The logistic regression model estimates the probability p as a linear function of the explanatory variables (HEdPERF dimensions). Only acad and prog are detected as statistically significant. The model is described by the following equation:

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 \cdot \mathbf{acad} + \beta_2 \mathbf{prog}$$

The above equation can be rewritten as

$$p = \frac{\exp(\beta_0 + \beta_1 \cdot acad + \beta_2 \cdot prog)}{1 + \exp(\beta_0 + \beta_1 \cdot acad + \beta_2 \cdot prog)}$$

In this case,

$$\ln\left(\frac{p}{1-p}\right) = -11.68 + 1.98 \cdot acad + 0.41 \cdot prog$$

Figure 5 describes the probability p of the event “a student is satisfied from feedback” taking into account the $acad$ and $prog$ dimensions. Each dot is the center of a cycle and represents the opinion of a student. Only 50 out of the total 469 points are shown in the figure, for the sake of clarity/readability. The bigger the radius the higher the probability of being satisfied. Also the higher the value of $acad$ and $prog$ the higher the probability, p . From the $acad$ and $prog$ coefficients it is evident that former dimension is more important.

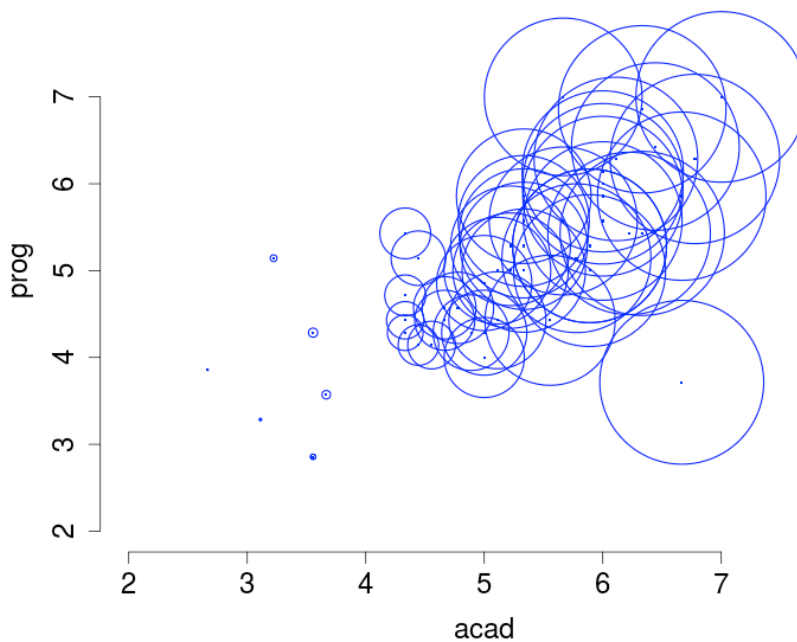


Figure 5: Probability p of the event “a student is satisfied from feedback” taking into account the $acad$ and $prog$ dimensions

The following histogram represents the opinions regarding $Edu3$ that is also negative skewed.

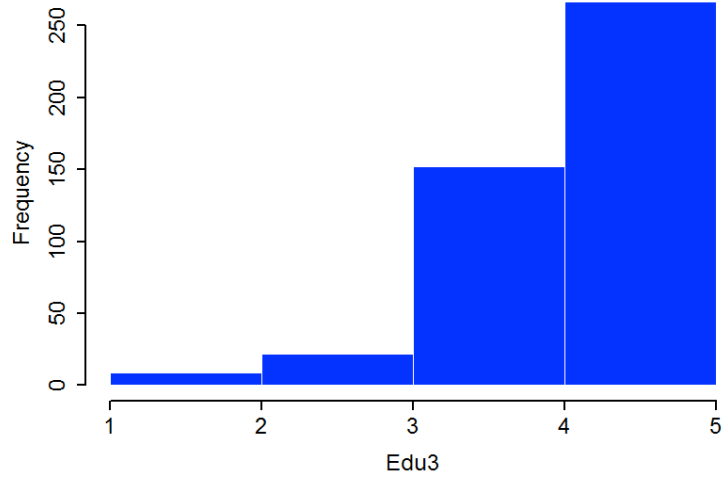


Figure 6: Histogram of Edu3

In this case,

$$\ln\left(\frac{p}{1-p}\right) = -5.84 + 0.43 \cdot \mathbf{faci} + 0.92 \cdot \mathbf{supp}.$$

Figure 6 describes the probability p of the event “a student is satisfied from special services” taking into account the \mathbf{supp} and \mathbf{faci} dimensions. Again, only 50 out of the total 469 points are shown in the figure, for the sake of clarity/readability. From the \mathbf{supp} and \mathbf{faci} coefficients it is evident that former dimension is more important.

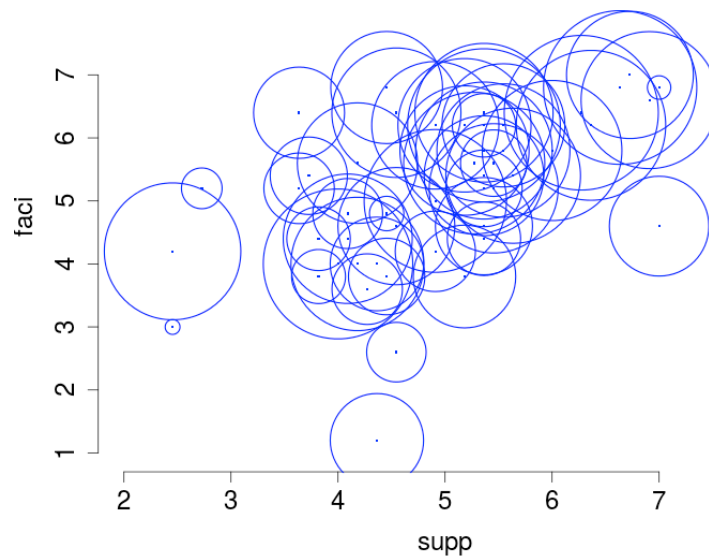


Figure 6: Probability p of the event “a student is satisfied from special services” taking into account the \mathbf{supp} and \mathbf{faci} dimensions

Conclusion

In the present paper initially the outcomes from a modified HEdPERF questionnaire are presented that was used to assess the service quality provided by a Greek educational organization, TEICM. Extending these results, the association of the five dimensions of HEdPERF with three important educational issues was investigated. Multiple linear regression and logistic regression models were employed in order to extract the statistically significant impact of the dimensions on aspects of the educational process of the institution.

The results regarding *Edu1* and *Edu2* which are associated with the core of the educational process showed that *Academic aspects* is, as it was expected, the most important dimension. However, *Program issues* dimension was emerged as a statistical significant dimension that influences *Edu1* and *Edu2*. The results provide strong indications that the reputation, flexibility and absorption from the labor market of the TEICM graduates are the essential quality components of *Program issues*. The indicated associations contribute to the fundamental elements of the institute, the teaching capabilities and the feedback about students' progress. Furthermore, the student's satisfaction about *Edu3* is linked mainly to the *Support services* and secondly to the *Facilities* dimension. The *Edu3* consists of 9 services whereas 4 of them are offered fully on line. This could partly explain that the *Staff* dimension was not statistically significant in any model of the above statistical analysis but could also mean that role of the non-academic staff is very weak at the age of online technologies especially in a higher education institution.

In this study HEdPERF was used together with some items which investigate important issues education quality. Their association provided some indications that HEdPERF can be effectively used to record education service quality. TEICM could benefit from this exploration and focus its efforts to alter the conditions that provoke low quality rankings. Knowing the relative performance of different dimensions and issues could help institute's managers to gain deeper insights into higher education service quality, draft various managerial strategies on how to improve activities of the organization and the provided services, and make better resource allocation. A qualitative research may give insights regarding what causes low quality rankings. As this is one of the first attempts to use HEdPERF to measure quality and other important education issues in Greece, other higher education institutes in Greece or other European countries with similar higher education systems should replicate the study.

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